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ABSTRACT

Results of a study of a pilot program exploring the application of reflective practice to educational administration are reported in this paper. The program goal was to create a design studio for the development of reflective practice among educational administration students. To accomplish this goal, the design studio provided explicit instruction and experience in applying theoretical, empirical, and experiential knowledge to practical problems. Expert practitioners coached students through the processes of problem solving and definition as they developed action plans. This process of cognitive coaching focused on school problems rather than on traditional subjects of study. Six coaches who were practicing school administrators were selected from the faculty of the Department of Educational Administration at the University of Utah to supervise graduate students enrolled in a seminar on the principalship. Program evaluation involved document analysis, participant observation, exit interviews with students and coaches, and review panel assessments. Findings demonstrate the need for coaches' training and practice in reflective and inductive questioning, fixed prerequisites for a student-focused design studio, continuous program evaluation, and provision of specific learning cases. (30 references) (LMI)

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LEARNING TO LEAD:
REFLECTIVE PRACTICE IN PRESERVICE EDUCATION

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Because the problems of public education in the United States are becoming more complex and varied as the century draws to a close, new approaches to defining and solving school system problems are more important to educational administrators. School restructuring, site-based management, shared governance, and merit incentives are among the reforms being used to address these educational problems. The school leaders who will make these new ways of organizing schools work need to acquire problem-solving skills. These skills will enable them to apply knowledge from many sources to the actions they take in schools. One approach to improving the problem-solving ability of school administrators (and other professionals) is known as "reflective practice." Interest in this approach to school leadership is growing, but specific programs for nurturing these skills during the formal education of administrators are just being developed (Hart, 1986, 1990a, 1990b; Hart & Sorensen, 1989; Murphy, 1990).

In this paper, we report the results of a study of a pilot program exploring the applications of reflective practice to educational administration education. The study investigated the power and potential of reflection as the principle around which a preservice course in educational administration could be designed. It also provided an evaluation of procedures used to accomplish this task. Modeled after the design studio proposed by Schon (1987), this pilot program used expert practitioners to coach students through the process of thinking about problem definition and

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problem-solving as they develop plans for action. This process of cognitive coaching focused on school problems (problem-based) rather than traditional subjects of study (subject-based). The goal of the pilot program was to develop a design studio that could nurture reflective practice in students of educational administration as part of their formal course of study. To accomplish this goal, the design studio provided explicit instruction and experience in applying theoretical, empirical, and experiential knowledge to the problems of practice.

The following sections of the paper include a brief overview of the background of reflective practice and a description of the components of the pilot design studio, research methods, findings, and conclusions.

Reflection: A Background

Over the last few years, educators and practitioners in educational administration have explored a number of approaches to improving the application of research, theory, and experience to the practice of school administration (Hart, 1990b). A number of these exploratory approaches--one of which is problem-based, student-centered learning--draw on traditions of cognitive science to improve problem identification and the creativity of solutions (Prestine, in press). A gradual shift in graduate professional training toward more problem-based learning is not unique to education. Other professional schools, working at the graduate level with adult students, are coming to rely on student-centered, problem-based methods of instruction in order to prepare expert practitioners highly skilled in applying the knowledge base of their fields to the problems of practice (Ramsey & Whitman, 1989). Focusing on the thinking process of students, these methods of instruction produce subject mastery equivalent to that achieved in rigorous subject-based

instruction. They also produce superior application, transfer, and problem-solving (Barrows, 1988). Consequently, problem-based learning which is focused on students rather than subject-based instruction which is focused on the instructor (Ramsey & Whitman, 1989) is gaining increased attention in professional schools. These methods of instruction have been developed in response to the ubiquitous and jarring experience students describe when they move from formal academic study into the practice of their professions and find that they have not developed strategies and skills in applying what they know to what they do.

Reflection (as it is used here) is much more than quiet thinking over past events. It aims toward a goal such as a set of solutions to dilemmas or problems or the redefining and understanding of "the problem." In pursuit of the goal, the person engaged in reflection creates a sequence of ideas, projecting possible consequences that will result in an outcome or in a series of events (Dewey, 1933). Because a knowledge base is required in order to form accurate projections, knowledge is a critical component of this process. This linkage between knowledge and potential outcomes, the progression of thought that links and expands complex parts of the whole, can lead to increased complexity, creativity, and surprise as new ideas emerge and lead to unexpected but productive conclusions. This outcome of reflection may explain why students in professional schools where the process is being deliberately applied have been shown to exhibit superior application, transfer, and problem-solving outcomes.

Reflection illustrates the application of cognition theories to professional education, providing a theoretical framework for understanding the process through which application, transfer, and problem-solving might be

enhanced. Through the use of mental advanced organizers, abstract patterns of reality called schema, people form initial perceptions and judgments of new events. A schema is a pattern of concepts and associations that repeatedly occur together which is held within the mind of a person and forms the expectations through which the person interprets new, related information (Thorndyke & Hayes-Roth, 1979). Schemata help people process and transfer knowledge from one situation to another (Luiten & Ames, 1980), and reflection provides practice in deliberately and systematically recognizing similar patterns in unique individual events. This can occur because relevant deviations from habitual behavior create vivid memories (Bower, Black, & Turner, 1979). These memories become resources for future reflection and action, and a relationship between action and memory is established.

The quality of future reflection and action also is increased as skill and knowledge increase. This occurs in two ways. First, as learning is assisted and inappropriate inferences reduced, skill improves. Second, as knowledge increases, the ability to draw appropriate inferences improves (Pearson, Hansen, & Gordon, 1979; Nickolson & Imlack, 1981). Intransigent problems and surprises that challenge existing schemata bring with them an important addition to the quality of reflection. As Schon (1983, p. 62-63) pointed out: When the phenomenon at hand eludes the ordinary categories of knowledge-in-practice, presenting itself as unique or unstable, the practitioner may surface and criticize his initial understanding of the phenomenon, construct a new description of it, and test the new description by an on-the-spot experiment.

The new description becomes an adjustment in a schema which will, in turn, be applied the next time an experience with similar (and some unique) characteristics occurs.

The final step in reflective practice is action. Action follows after a schema is applied, adjustments made when necessary, and inferences drawn. When steps are taken, the act is integrated with knowledge and thought. Outcomes of action may lead to further adjustments in the existing schema. Continuous repetitions of this process throughout a professional career lead to development as a reflective practitioner. The logic supporting a move toward the development and inclusion of experiences designed to teach the reflective process in educational administration education is thus supported by cognition theory, philosophy, and research on the application of professional knowledge by practitioners who have been educated using traditional subject-based, instructor focused methods and those who have been educated using more problem-based, student focused methods.

Components of the Pilot Design Studio

The conceptual framework for a design studio was developed by members of the Department of Educational Administration at the University of Utah as part of a Danforth Foundation project to improve the quality of university programs of educational administration. First, the faculty participated in initial planning based on a literature review, department discussion, feedback from other universities in the Danforth project, and program review. Then faculty members and graduate students met to form a preliminary outline for a pilot structure for the design studio. These discussions led to a commitment to run a trial studio during the winter of 1990. Final planning was completed in the summer and fall of 1989 (Hart & Sorensen, 1989).

Components of the studio included: (1) problem-based stimulus materials for students; (2) professional coaches; (3) theoretical/empirical resources; (4) student action plans (written); (5) and a panel of professors, superintendents, and principals who reviewed written plans and oral arguments, questioned students, and prepared systematic feedback and assessment.

Stimulus materials were prepared by the faculty and a graduate student from a core of case problems collected over a four year period in a seminar on the principalship, published cases, and faculty and graduate student experiences. Two sets of materials, one for elementary school and one for secondary school, were written. Five major dilemmas were presented in both situations. The dilemmas included issues relevant to traditional courses and seminars in administration and leadership, policy, personnel, finance, law, curriculum, and instruction. While drawn from real field experiences, the cases were fictionalized in order to present the range and depth of the administrative preparation curriculum (Ramsey & Whitman, 1989). Prior to the beginning of the design studio, the coaches read each set of stimulus materials and suggested some changes and additions. A teacher supervision issue was added to the secondary school issues as a result of this review. Students chose to work from either the elementary or secondary school materials.

Coaches were selected from adjunct and clinical faculty of the Department of Educational Administration at the University of Utah who were practicing school administrators. Six coaches agreed to participate. They included elementary, junior high, and high school principals and assistant principals. One of the coaches was the president-elect of the national Association for Supervision and Curriculum Development (ASCD). Coaches met

prior to the studio sessions for orientation and training in reflective questioning, coaching, and problem-solving techniques. The faculty member responsible for the seminar and design studio served as a seventh coach during studio sessions.

Background reading for participants (students and coaches) presented some challenge for the operation of the pilot studio. A full problem-based course of study would move students systematically through problems designed to send students to a curriculum and to resource materials necessary to address the assigned problems so that subject mastery would be complete. At this experimental stage, this was not possible. Because students were drawn from those enrolled in a graduate seminar on the principalship, prerequisites could not be required for the pilot. While most of the students had completed a substantial proportion of their course work for administrative certification, two of the five who eventually completed the studio had not. Two basic texts thus were assigned as a common knowledge base from which students would draw (Bolman & Deal, 1984; Duke, 1987).

Studio activities covered a ten week period, primarily because of the limitations imposed by the academic quarter at the University of Utah. The first four weeks of the seminar, students systematized their notes and readings from previous course work and together completed the core assigned readings in school administration (Duke, 1987), organizational analysis (Bolman & Deal, 1984), and reflective practice (Hart, 1990a). Students kept weekly journals of their readings and seminar discussions. During the next four weeks students met for 1 1/2 hours with coaches in reflective questioning sessions followed by 1 1/2 hour debriefing sessions with the instructor.

Coaches rotated among students so that each coach and each student would have at least two sessions together if possible.

At the end of the four weeks with the coaches, each student prepared a written action plan which included the following sections: (1) a philosophy or vision statement that included a description of the hypothetical school under their leadership; (2) specific action recommendations for each of the five dilemmas in the stimulus materials; and (3) an overall plan for the school which unified their action plans across dilemmas. Written plans included specific references to empirical and theoretical knowledge acquired during their formal studies (in this or any other course), individual experiences and coaches' feedback, and exemplary practice collected as part of their data gathering and problem-solving. Action plans then were submitted to a panel of professors, superintendents, and principals who read and evaluated them in advance. The panel sat as a review board for oral presentations and questions at the end of the 10th week of the quarter. The panel members and instructor provided feedback to students in written and oral form.

Research Methods

Three researchers participated in the studio design, writing of materials, orientation of coaches, data collection and data analysis--one faculty member and two graduate students in the Department of Educational Administration at the University of Utah.

Data Collection

Data included: student journals; participant observation notes (collected as systematic field notes by the instructor who also worked as a coach and a review panel member); systematic field notes of all coaching sessions collected by a second researcher; stimulus materials; orientation

materials for participants; orientation materials for coaches; exit interviews of students and coaches; final action plans; and review panel assessments of action plans and field notes of feedback given by the review panel members to the students.

The first source of data was student journals. Each student was required to keep a journal in which they reacted to the assigned readings during the first four weeks of the quarter and reflected on their problem-based experience during the subsequent six weeks. The journals provided data about the accessibility and usefulness of the reading material chosen for the course and a glimpse into the struggles and insights students experienced.

The instructor (and first researcher) provided a second source of data. In addition to organizing the pilot, the instructor worked as a cognitive coach during the four coaching sessions. Following each session and after the review panel presentations, the instructor wrote a description of the events of the session and a reflection on the experience in the form of systematic field notes.

Third, the second researcher attended each session of the design studio. During each coaching session, acting as a nonparticipant observer, she collected scripts of the interaction between coaches and students. Following each session, these data were expanded into systematic field notes in three sections: (a) a verbatim account of segments of the exchanges between coaches and students and summaries of other exchanges, descriptions of behavior, a record of periods of silence and data scanning by participants, other objective details of the session, and a record of time elapsed; (b) a description of the affective characteristics of each observed session between coach and student; and (c) a general description of the session. A systematic

sampling of coaches and students was made so that each coach and each student was observed in varying pair combinations. Coaches each attended two of four sessions and were observed at least twice (with one exception). Students were observed three or four times (with one exception, a student who was absent from two of the four sessions).

Fourth, the documents prepared for students and coaches were a source of data to be analyzed for relevance and usefulness to the overall experience in the design studio. These included the stimulus materials or problem descriptions, the orientation materials for students, and the orientation materials for coaches.

Following the presentation of the final action plans to the review panel, a researcher (not the instructor) interviewed the coaches and students. Participants were asked to assess the materials, process, and products of the design studio, describe the most useful and most difficult or negative aspects of the experience, and make suggestions for improving the design studio in the future. Interviews were conducted at the students' and coaches' schools or at the university at the convenience of the participant. Field notes from these interviews, which lasted from 30 minutes to one hour and were completed within one week of the final presentations, provided a fifth source of data for the study.

The final action plans prepared by students provided a sixth source of data. The students chose to impose an organizational pattern for the final action plans to assure that consistent expectations and standards were applied to the assessment of each plan. These sections were: (1) a philosophy or vision statement that included a description of the hypothetical school under their leadership; (2) specific action recommendations for each of the five

dilemmas in the stimulus materials; and (3) an overall plan for the school which unified their action recommendations across dilemmas. Students explicitly cited research and practice to support their recommendations.

Finally, each member of the review panel prepared written comments on the action plans and then participated in a formal presentation and questioning session. Final evaluation of the action plans came from written comments of panel members and systematic field notes taken by a researcher on the feedback given by the review panel members to the students during the presentations, field notes made by the instructor during and after the panel review presentations, and a final reading by the instructor.

Data Analysis

Data analysis followed established procedures of qualitative research. Conceptual categories were used to code data. Then the researchers prepared data summary sheets, analytical matrices, and text analysis summaries (Guba & Lincoln, 1983; Miles & Huberman, 1984). For this preliminary report, the observation notes, exit interviews, action plans, and action plan assessments provided the primary sources of data.

First, coding categories based on problem-based professional education, reflection, and cognition research were developed from the original research framework. These referred to common problem-solving errors made by students, inferential questioning, and the common readings.

Second, data were read by one of the researchers and a set of preliminary inductive categories developed. These were then used in concert with the deductive categories to code the observation notes and exit interviews in a second reading. A second researcher then conducted a coding audit, noting differences or omissions from the first coding and suggesting

additional categories that the preliminary coding neglected to encompass. A second coding audit was then conducted by a third researcher. Where disagreements remained, the two auditors met and agreed on the final coding. This process led to the development of the final categories discussed in the findings section of this paper.

Third, the researchers created data summary sheets and matrices of the final coding. The summary sheets included coding totals, across time, and by participant. The matrices presented data for participants (coaches and students) by coding frequency, participants by session, and session totals (providing a view of the development of issues across time). This process provided a means to assess the prevalence of particular issues and their frequency in relation to individual participants over time.

Finally, the researchers compared summary sheets, matrices, and raw data coding to the assessments of the final action plans and presentations. This process provided a means of comparing process and outcome data.

Findings

The findings related to coaches and students are reported separately for ease of discussion and are organized by conceptual category. Issues of frequency, intensity, preference, and effectiveness are addressed within each section.

Coaches

The coaches differed in their ability to stimulate students' thinking and in the usefulness of their preferred approaches from session one to session four. They also provided helpful suggestions for future studio structures. The coach identified by students as least helpful overall was the

most directive about what should be done from the first session, asked the fewest questions, and provided no conceptual or research guidance.

Design Studio Processes

The conversation between coaches and students fell into two main categories--casual talk, either job related or personal, and problem focused talk. A third category of talk focused on the process of the cognitive coaching sessions and occurred with about half the frequency.

Casual Conversation

The benefit of personal interaction, aside from the benefits of problem-solving, surprised the instructor and studio participants. Coaches told stories about their schools that were similar to the situations in the stimulus materials. While the coaches kept story telling to a minimum (only thirteen stories among six coaches in four sessions), the students said it helped them get to know the coaches. It also gave them an increased sense of belonging in the profession of educational administration. The next most frequent form of conversation in which coaches and students engaged was related to educational issues in the state and their communities. Four of the six coaches used this small talk to break the ice. Students, too, sometimes initiated these conversations but less frequently than did coaches. However, the two students whose final action plans received the highest ratings from panel members and the instructor were the least likely to initiate conversation on personal and community topics.

Another form of casual exchange, often as the sessions were just getting started, was job talk. One coach referred a student to a specific job opening. Others talked in general about openings in their districts or about the major issues they saw facing those entering administrative careers.

Finally, the coaches used praise to direct students toward ideas they found promising. One coach said in session one, "You have had four very good ideas." He then reflected back on the insights he felt the students had raised, reinforcing the early questioning.

Problem Focused Talk

Coaches used two techniques most frequently to address the issues raised in the stimulus materials: (a) suggesting possible actions and (b) asking for information from the student related directly to the stimulus materials. A third technique, conceptualizing or referring students directly to research or theory, was used less frequently (about half as often), but four of the six coaches directed students to helpful resources or raised conceptual issues. All three techniques, when used appropriately, were effective in helping students question their ideas. Coaches offered suggestions with equal frequency across all four sessions. In contrast, their use of questions designed to solicit information, brainstorm, or press students to expand their thinking increased from session one to session two and then decline rapidly. Coaches' use of questions to elicit information appeared a total of 60 times in the observation data. References by coaches to research were equal across sessions, except for a marked decline in session three (26 coded observations). However, only one of the four coaches who offered conceptual guidance or referred to research attended session three.

Coaches offered suggestions in a number of useful ways and one way which was less useful. The useful suggestions directed students but stayed away from conclusions. For example, coaches said: "You might bring in a teacher you trust and observe together." "You need to check the district evaluation policy." "You protect yourself with due process." "If you get a policy from

the faculty council, there will be more support." The coaches who relied on directives simply told the students what to do. One coach told a student to bring in "concerned parents who you could work with, and consider the parent's background and skills." Another time, the same coach said:

> You need to see how this fits into the overall school philosophy...you bring the information to a curriculum committee to see if it fits with the rest of the school. You as the principal don't want to confront the teachers with an ultimatum. You might have to do a holding pattern..., get it away from the emotional issues.... Put some articulate parents on the committee.

Direct suggestions for possible action from coaches appeared 56 times in the observation data.

By their own account, coaches found questioning more difficult to do than offering direct suggestions but managed to use problem directed questions slightly more frequently that direct suggestions. Questions directed students toward district policy, challenged student categories, and probed the appropriateness of student problem-solving approaches. Coaches' requests for information that directed students toward problem-solving appeared 60 times in the data and were worded in a number of ways. For example: "How are these items inter-related?" "What do you really know about what is being taught [in the classroom]?" "How would you approach this?" "Can you think of any other way to find out who is on duty?" "How can you get to the true feeling of teachers?" "What do you see as your role in this?" "Why not?" "Where would you go for information?"

The third technique coaches relied on directed students toward research, particular disciplines (such as law, organizational theory, or political science), and conceptualizations of school administration. These statements and questions directing students toward specific knowledge sources were coded 26 times. For example, coaches said: "Think in terms of district policy and state law." "Look into the research on school climate." "Another problem is copyright law." "What does the effective schools literature say about curricular offerings?" "Have you thought about the consistency of the program--the continuity?" "Have you thought about your philosophy?" "Have you checked her personnel file and made sure you understand all parts of the evaluation?" "What does the state law say about evaluation procedures?"

Process Focused Talk

The process interaction between students and coaches focused on which issues in the stimulus materials students wished to take up during a session or took the form of negotiations about the process they would follow ("Let's talk a little about the readings."). At one point, an overwhelmed student said he was unsure what to say. Another said he was "realizing that the iceberg is bigger than I thought."

Process talk between students and coaches declined steadily from session one to session four. In sessions one and two, ten such exchanges were coded; in session three, five were recorded; and in session four, only two. Even though the coaches attended only two of the four sessions and rotated through (a structure designed to minimize the demand on coaches), students and coaches quickly became more proficient in the process as time passed.

Exit Interviews

In the exit interviews, coaches were asked a series of questions: (a) Could you give me a general reaction to your experience with the design studio as part of an educational administration program? (b) What direction did your questioning seem to take most comfortably? (c) What kind of questions yielded the best responses from students in your assessment? (d) What would you say might be the major advantages and disadvantages of an approach such as the design studio in educational administration programs? (e) What changes would you recommend? (f) What did you like most and least about the stimulus materials? Changes? and (g) Have you any feeling about this method's potential for inservice as well as preservice?

Overall, coaches reacted positively to the design studio experience, calling it a "unique approach to training." They were "very enthusiastic," "very positive" and saw it as "very practical" and a "great opportunity to blend theory with the practical." Coaches agreed that its major advantage might be in the way the process "challenges preconceived ideas." Coaches also identified a number of problems with the design of the pilot. They pointed out that the stimulus materials combined with initial readings presented students with an "overwhelming amount of material," that "students seemed overwhelmed."

The structure of the studio received some criticism. Coaches said that, while the studio required a "large time commitment," the coaches probably should attend all four sessions rather than just two. To alleviate the pressure this would cause, they suggested that a stipend for the coaches would be justified.

Coaches who were most effective (according to student reports) argued that they took their cues for questioning from the students and "always had to

come back to looking at the full picture," asking "how does this fit into the plan of the school--the holistic approach." They "tried to get students to see implications," to "look at what they would need to check out." Others reported that they felt "pressure from students to answer questions."

When asked what kinds of questions yielded the "best" responses, coaches identified question forms that directed students toward problem solving. They said: "What if?" "Have you thought about...?" "Where would you find this information?" "How would you feel if...?" They also referred back to the need to look at the "whole perspective" and force students "to look at their own philosophies and beliefs." They felt that they needed to remind students to "look at facts."

The advantages and disadvantages of the design studio in the eyes of coaches focused on high quality outcomes and high costs in time and overload resulting from the complexity of its demands. They argued that adding reading assignments at the front end was too much when followed directly by the problem-based phase of the studio. The advantages coaches saw centered in "the mix of theory and text book with the practical" under the guidance of the coaches, its "hands-on, experiential" nature, the variety of "mentors" the coaches represented and their varied perspectives, and the personal interaction between coaches and students. (One student volunteered after his exit interview that several administrators he had told about the design studio had said they would like to be coaches.) Coaches sometimes contradicted themselves when they listed disadvantages. Along with the "overwhelming" complexity of the materials and time restrictions, they mentioned that the design studio failed if it was meant to simulate the time frame under which decisions must be made in administrative work. One contended that "students

don't feel the time pressure" and the studio is "not real life." One coach pointed out that he had a "tendency to give students too much information rather than get them to reflect," an observation that the field notes confirmed.

The coaches had several suggestions for improving the structure of the studio. They agreed that more than two sessions involving each coach would be helpful, that coaches should be more involved in the entire process--meeting to discuss their work midway through the design studio, sitting in on the final action plan presentations, participating in short debriefing sessions like those held for students following each session, and meeting together at the end of the quarter for debriefing and planning. They also felt that the training and readings had not prepared them sufficiently and wanted more training, more work on questioning techniques, and role playing and practice sessions.

Criticizing and praising the stimulus materials for the same characteristics--(a) complexity that was almost overwhelming and (b) realism --coaches generally found them useful and well organized. They felt they were well written, "dealt with important points," and "dealt with practical and realistic issues."

The potential of design studio work for administrator inservice development received mixed reviews. The coaches saw it as particularly useful for administrators in their first three years or so of work, as a means for dealing with common problems, and as a way to talk with other administrators and form professional networks. But one coach was adamant about "no writing!"

Students

Students, too, provided data from observations and interviews. Their action plans and debriefing sessions also provided important data for interpreting possible connections between process and outcomes. Because this is the first data set comparing process and outcomes, however, and because the number of participants was small, data do not justify drawing causal inferences.

Design Studio Processes

Students talked with coaches about interaction processes and engaged in three main problem-solving processes: (a) they productively pursued problem definition and solutions; (b) they committed problem-solving errors; and (c) they sought information and answers.

Problem-solving

Students effectively used relevant diagnostic questioning, synthesis, and brainstorming or hypothesizing in their interactions with coaches during the design studio sessions. They also openly expressed concern and uncertainty. Students most often used coaches' new concepts and theories after the sessions were over and talked about them during the debriefing sessions. Only four times did students use new concepts while still working with a coach to adjust the direction of their thinking.

Relevant diagnostic projection or questioning appeared thirteen times in the observation field notes. Students seemed to use this approach most during the second session, but, like the use of concepts and theory by coaches described above, this apparent pattern may be a result of the observation sample during this session. The two most proficient problem-solvers (and those who produced the most highly rated action plans) were two of the three

students observed during this session. Students identified issues for future problems-solving such as "communication networks," "problems between different groups of teachers," district level involvement, questions about documentation, district services the could use (personnel, legal counsel), and research on discipline and reinforcement as means for pupil control. They questioned comparative criteria for reading programs, moved toward the examination of policy, asked "how specifically do you document" and "when do you write a letter of reprimand?"

Students synthesized information appropriately 10 times while being observed. Incidents of synthesis increased with each session. Students used a variety of techniques to accomplish synthesis in their problem-solving (e.g., decision trees, summary sheets for issues and questions of policy, curriculum, instruction, participative decision making, school climate).

Brainstorming, hypothesizing, and seizing on serendipity as new directions unfolded during conversations with coaches became by far the students most common approach to problem-solving. This was observed 24 times. It was most familiar and elicited responses from coaches. Brainstorming dominated sessions one, two, and three as students began to define problems, got to know the coaches, and began to formulate preliminary conclusions. Students speculated about ways to "gather facts," projected possible teacher and parent responses to actions they might take ("They might say they don't have time; this might be an indication they have too many duties."), and "saw things from a whole different angle." During these exchanges, students sometimes credited coaches with helping them with a breakthrough. "I felt I was stopped, and now someone has opened the door."

Problem-solving Errors

This section was coded using categories derived from literature on problem-based professional education and common problem-solving errors that occur. Data were examined for the presence of pseudodiagnositicity (seeking data that will not be helpful), incorrect synthesis (unwarranted conclusions), inadequate synthesis (not coming to a conclusion that is warranted), premature closure, and anchoring (selective lack of attention to important information inconsistent with earlier thinking or experience). Identifiable examples of these errors were most common during the first session, and no incidents of problem-solving errors appeared in the observation notes from the last coaching session. However, we found these errors hard to identify from verbatim records and paraphrased conversation in the field notes. They were more identifiable when students made their final action recommendations in the action plans.

Search for Unhelpful Information or Pseudodiagnositicity. Only one exchange between a student and coach was coded as an incident of unhelpful information search, and this occurred in the third session. Students were far more likely to reach unwarranted conclusions or limit the amount of information sought.

In the action plans, this problem-solving error appeared as digressions from parsimonious solutions and elaborate plans only tangentially related to core issues. It also may have been apparent in two of the five plans that failed to formulate a persuasive case for a school-wide initiative that unified the approach to the five cases within the stimulus materials.

Reaching Unwarranted Conclusions or Incorrect Synthesis. Five exchanges were coded as incorrect synthesis in the observation notes. These occurred in

sessions one and three. Students who committed these errors labeled a problem "simple" in the first session and moved on to other issues, made action decisions in the first session ("I would give parents the option to pull kids out [of a class]."), or reached conclusions that ignored other critical issues such as budget or policy ("Well, if all you need is an aide, couldn't the school just provide that?").

The instructor's participant observation notes provided data about ways this problem-solving error emerged. One student adopted a decision tree method for defining and attacking problems and always identified two branches to each level (either this or that). He prepared an elaborate chart of branching issues with bipolar extremes as the only options and persuaded another student to model this system during the third session. This system led to unwarranted conclusions, but it also encouraged the student to ignore information that conflicted with his early judgments about the nature of the problems he confronted. The second student later abandoned the decision trees he had developed for more divergent options before developing his plan. When final action plans were written and presented, one review panel member labeled the first students' recommendations excessively authoritarian, lacking in creative team or group solutions, and arrogant.

The action plans also revealed this error more vividly than did observation notes. As students sought research, theory, or exemplary practice citations to support their conclusions, several found themselves stymied. Three of the five final action plans completed suffered at least in part from this error.

Failing to Reach Warranted Conclusions or Inadequate Synthesis. This error show up only in later sessions and in action plans. Coded only three

times in observation notes, it was noted by the review panel in two of the five action plans. The two students who committed this error in their action plans were the two who were early in their administrative course work. One of the students phrased conclusions tentatively and provided overly lengthy explanations nd justifications for each action recommended. The other planned intrusive actions insupportable under state law and research on effective practice and ignored important actions warranted by the data.

Premature Closure. Premature closure occurred early (six incidents in session one, two in session three). The two students most likely to commit this error also suffered from incorrect and inadequate synthesis. Both had strong opinions about what "ought to be." One laughed during one point in the first session and said, "I don't see what the problem is. The principal should just tell the teacher she has to do what he says." She didn't think one of the issues was even appropriate in the stimulus material because a principal should be able to demand compliance regardless of an external or professional justification for action.

Selective Inattending or Anchoring. The two students who reached premature closure (in the first session) also failed to respond to information inconsistent with the thinking and experience they brought to the design studio. One remained steadfast in her surety. One finally recognized, as noted above, that he had only tapped the "tip of the iceberg." This error also was difficult to detect in the observation notes, partly because the one student most likely to commit it failed to attend two of the four sessions, but partly because coaches didn't probe statements by students, helping to reveal the error.

Information and Answer Searches by Students

Twelve times during the four sessions, students asked coaches directly what they would do. Often, coaches' advice giving followed these requests. One student openly asked "what do you think about this problems?" during the first session. Another asked a coach, "How realistic is this?" Student insecurity led to other questions: "Have you had a problem like this? How did you respond to it?" At other times students asked for a summary judgment from the coaches, pressuring them to give an answer: "Is it best to go through the parents or work it out with the legal counsel?"

Students and coaches recognized this problem and talked about it in debriefing sessions and exit interviews. Lack of preparation for recognizing problem-solving errors and dealing with the coaches led them to recommend specific training to address this problem.

Exit Interviews

With reassuring frequency, students identified the same advantages and disadvantages to a design studio, problem-based approach. Students were asked: (a) Could you give me a general reaction to your experience with the design studio as part of an educational administration program? (b) What direction did coaches' questions take that was most helpful to you as a student? Did the most helpful type of questions change over the four sessions? (c) What kind of questions from coaches had the positive impact on your own problem-solving process? (d) What would you say might be the major advantages and disadvantages of an approach such as the design studio in educational administration programs? (e) What did you like most and least about the stimulus material? What changes would you recommend? and (f) What

changes would you recommend for future studio experiences that would make it a better learning experience for students?

The general reaction of students to the design studio was positive. Students said they "really enjoyed it," found it to be a "wonderful experience" to which they "always looked forward to coming." One student labeled it his "most exciting class so far." Another called it the "most difficult class but equally rewarding." The students argued that the studio made "other classes meaningful." The problem-based, interactive nature of the course formed the central feature on which students focused praise. They found they "liked mixing with other class members," "reading the materials," and interacting with the coaches. As a result, they argued that the studio gave them a broader "perspective of what a principal does" and "helped [them] look at a range of possibilities." The time pressure caused by the need to address five complex factual situations in a school and make action recommendations in six weeks made one student feel "against a wall and unclear about what [he] was doing." Another pointed out that they spent "a lot of time."

Coaches helped students most "when they tried to get me away from my tunnel vision, when the students made the effort to bring more ideas with them to sessions, and when they searched for knowledge. One said, "The more ideas I had, the more they gave me," while another pointed out, "Questioning was more helpful as I did more reading." Students felt that questions that forced them to "go broader" in early sessions and "narrow down" in the last sessions helped them the most. They also admitted that "at first, questioning was hard to deal with."

Feedback, back and forth between coach and student, had the most positive impact on their problem-solving, according to students. They like "what if" and "what about" questions and praised coaches who responded to their conclusions by asking, "If you did this, can you see that this might be a problem?" in later sessions.

The advantages students identified centered around the studio's "absolutely practical" approach to administration, the "controlled situation," and "working with coaches" to develop a stronger sense of their own approach to administration. They said it provided "insight into what it is really like to be a principal" and let them see there are "multiple methods to solving problems." One student argued that the questioning and problem-solving would be "helpful for future interviews" for administrative jobs and another that it provided "insight for future classes." Like the coaches, the students identified disadvantages that might be construed as contradictory to the advantages; while one student said the studio made her more sure of herself, another said it made him less sure of himself. While one said it helped them see that multiple solutions are possible, another identified the fact that he "wondered if there is an ultimate solution" as a disadvantage. However, students did say that the complexity of problems--five situations, each with many issues--was overwhelming at times and felt the time pressures were not realistic.

Students liked most the realism, high interest, and challenge of confronting the issues in the stimulus materials. They liked least the complexity of overlapping problems, a lack of skills on their part for linking theory to the action plans, and how draining the pressure to produce and defend an action plan was for them.

The changes recommended by students also mirror recommendations from coaches and illustrate the tension between creating a manageable problem with enough complexity to convey reality in administrative work. Students wanted some time to work (perhaps a two week break in the middle) without interacting with coaches so they would have more to present. They also would have liked a more lengthy presentation and defense time. All these requests place additional pressure on the time frame of an academic schedule. Several felt that assigned readings left them with too much to absorb prior to the coaching sessions.

Summary and Conclusions

The foregoing findings lead to a number of general conclusions. Coaches pointed out ways in which they had grown, even wishing they had been able to have a similar experience during their own professional educations, and ways the studio could be used for inservice professional development. Students praised the chance to engage one-on-one in problem-solving with thoughtful, expert practitioners, the direct application of knowledge to action, and the focus on their own responses to the problems of practice. They also identified forms of questioning they felt facilitated their own thinking and helped them move toward planning and justifying their actions. Areas that needed further development became apparent from the observations, interviews, and action plans. The writing and sequencing of the stimulus materials, training and experience of the cognitive coaches, structure of the coaching sessions (including forms of questioning deliberately sequenced in the planned sessions), student response formats and action plans, and subject-based knowledge foundation of students and coaches all raised questions. A number of more specific conclusions emerged from the analysis as well.

First, coaches require training and practice in reflective and inductive questioning. In order to help students define problems, assess what is known, survey possible actions, and make action plan decisions, coaches need personal expertise and experience in administration but also in the cognitive processes on which the design studio depends. This takes resources, effort, and time and makes it unlikely that a design studio program can function using new coaches for each studio or without resources to support the coaches. By using technology such as interactive video disk, this high human resource demand could be alleviated, but the personal nature of interactions between coaches and students provided a signature feature of the design studio frequently praised by participants. We believe it should not be abandoned.

Second, productive questioning techniques at the beginning of problem definition differ from the most effective questioning and interaction techniques near the end of a studio experience. When students begin to probe the stimulus cases, they often focus on issues familiar to them or apply inappropriate and limited personal experiences, reaching premature conclusions or ignoring diverse possibilities. Questions at the beginning of problem definition that stimulate divergent thinking and highlight that students "do not know what they do not know" stimulate quick engagement and increase search for knowledge at the early problem-solving stages. Questions that help students reach closure by eliminating options and explaining rationales lead to more singular and concrete action plans toward the end of the studio experience.

Third, serious issues related to the stage in a preservice program during which a design studio might be most useful require further examination. While students near the end of their course work argued that they needed

problem-based experiences earlier in order to become more skilled in problem-solving techniques that involve multiple issues and to develop explicit links between what they were learning and what they might do, those nearer the beginning of formal course work felt restricted by their limited subject-based knowledge. The subject-based study of the foundation readings in four weeks left students reeling over too much too fast and reporting significant cognitive overload. Yet, without these readings, students faced the problem situations from radically uneven knowledge bases. These findings support the argument that problem-based learning can be built into a number of subject-centered courses more systematically and advantageously. However, a student-focused design studio requiring that students address a multifaceted and complex set of problems in unified ways, applying knowledge across a broad spectrum, should have fixed prerequisites to protect students.

A fourth conclusion follows naturally from the third. Problem-based, student-centered learning may deserve examination hroughout professional preparation for educational administration. The experiences of a few professional schools that have reorganized their curriculums and programs of instruction around problem-based, student-centered methods support this conclusion (See for example, the Southern Illinois and Harvard University medical schools and the doctorate of pharmacy program, University of Utah).

Fifth, the preparation of good teaching cases requires more than the compilation of real experiences from the field. Depending on the stage of a program of study and the learning goals of the course or field experience, a teaching case may need to be more or less complex and interactive, point students directly toward different reference materials or knowledge bases, and raise dilemmas of varying familiarity. This need could be met by

systematically collecting vivid cases arising in school administration as part of the knowledge base (Osterman, 1989) and by developing cases designed to teach specific subjects as part of the formal curriculum for educational administration education.

Sixth, students in educational administration experience problem-solving successes and errors similar to those encountered by people in other situations. They learn to seek solutions through diagnostic questioning, synthesis, brainstorming, and the application of experience and knowledge. They make some common errors--seeking data that will not be helpful; reaching unwarranted conclusions; failing to reach conclusions warranted by the data; premature closure; and selective inattending or failure to attend to new information which seems inconsistent with earlier thinking. These successes and errors occur with different frequency at successive stages of the problem-solving process. Early in the process, the students were more likely to rely on more familiar problem-solving techniques, such as brainstorming and testing coaches' responses to their ideas. Only two students developed proficiency at relevant diagnostic questioning. Early errors also differ from those common in the later stages. In the first two sessions, the students in our study were more likely to reach unwarranted conclusions, reach premature closure, and fail to attend to new information inconsistent with their earlier thinking. Later on, students more frequently failed to reach warranted conclusions and reached unwarranted conclusions while finding it difficult to make explicit connections between their knowledge and experience and the actions they recommended. Certain kinds of errors are more common for some students than for others, suggesting that students need careful diagnosis of

their reflection and assistance with that process during the studio experience.

Several problems arose in recognizing problem-solving errors during coaching sessions and in coding problem-solving errors during analysis. First, the ambiguity in the school-wide situations depicted in the stimulus materials, which was necessary to maintain a balance between complexity and manageability, made coaches and researchers reluctant to dismiss the relevance of any information search in early stages of the design studio. Only blatantly disconnected searches clearly warranted this label. Second, the indeterminacy of administrative work made incorrect synthesis and inadequate synthesis difficult to identify. As there always are a number of possible problem definitions and solutions that might be warranted, these errors were not easy to decipher during sessions and only became apparent when final action plans were designed. Two of the five students reached a number of conclusions that review panel members felt were unwarranted or insufficiently supported by the students. One (who was at the beginning of her administration course work) made inadequate recommendations, failing to bring her problem definition and solution process to adequate closure according to the review panel. Two of the five (one elementary and one secondary) presented action plans that the review panel found creative, appropriate, and complete. Third, premature closure and anchoring (lack of attention to new information inconsistent with earlier thinking) occurred with more frequency (eight and four coded references respectively) and early on in sessions. Anchoring also could be identified in the final action plans.

Coaches need to be explicitly prepared to recognize and deal with common errors and have strategies and techniques to point students away from them.

We found them difficult to differentiate in early stages of the studio, in part because no advance work with the specific combination of challenges in the stimulus materials was undertaken and no practice identifying problem-solving errors was provided. Coaches found that general reading and brief training in reflective practice techniques and cognition research was insufficient preparation to deal systematically with these problems. This finding raises the possibility that training for coaches, active engagement by coaches throughout the quarter with the instructor, and final assessment should be increased substantially. This will require more resources and more commitment from coaches who are already busy administrators.

In conclusion, while much talk abounds about the importance of change leadership and problem solving for school administrators, little systematic alteration of professional preparation programs is accompanying school reform (Hart, 1990b). This study reports some results of an attempt to make such a change grounded in cognitive theories of adult learning and action. The results present a complex yet realistic view of changes in professional preparation that can enhance parallel attempts to improve educational practice and leadership. It provides options for reform internally (within courses currently taught) and systemically (of entire cognitive structures underlying degree programs).

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